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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
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EXAMINER

LEWIS, MONICA

ART UNIT

PAPER NUMBER

2822

DATE MAILED: 12/12/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

| | | | |
|------------------------------|------------------------|---------------------|--|
| Office Action Summary | Application No. | Applicant(s) | |
| | 10/657,867 | PARK ET AL. | |
| | Examiner | Art Unit | |
| | Monica Lewis | 2822 | |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 25 October 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 21-28 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 21-28 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 09 September 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

1. This action is in response to the request for continued examination filed October 25, 2006.

Continued Examination Under 37 CFR 1.114

2. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after allowance or after an Office action under *Ex Parte Quayle*, 25 USPQ 74, 453 O.G. 213 (Comm'r Pat. 1935). Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, prosecution in this application has been reopened pursuant to 37 CFR 1.114. Applicant's submission filed on 10/25/06 has been entered.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 21-23, 26 and 28 are rejected under 35 U.S.C. 103(a) as obvious over Ryum et al. (U.S. Publication No. 2002/0058388) in view of Arai (U.S. Publication No. 2004/023526) and Emons et al. (U.S. Patent No. 6,100,152).

In regards to claim 21, Ryum et al. ("Ryum") discloses the following:

- a) a semiconductor substrate (1) of a first conductivity type (For Example: See Figure 3a);

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b) a collector region (11) of a second conductivity type, which is defined by first and second isolation regions (17) on the semiconductor substrate (For Example: See Figure 3a);

c) a first base (21b) semiconductor layer of the first conductivity type formed of a silicon germanium (SiGe) layer, which extends across the upper surface of the collector region to the upper surface of the first and second isolation regions under base electrodes (Note: Although the prior art does not specifically disclose extends from the upper surface of the collector region to the upper surface of the isolation regions, it does disclose the base layer and isolation layer at the same level as disclosed in Applicants invention. The base layer "extends" from both layers as disclosed in Applicant's invention.) (For Example: See Figure 3a);

d) an emitter region (35) of the second conductivity type formed on the first base semiconductor layer to contact the first base semiconductor layer in a region which is defined by emitter insulating layers (37) formed on the first base semiconductor layer (For Example: See Figure 3a and Figure 3c);

e) second base semiconductor layer patterns (21a) of the first conductivity type formed of a silicon layer, which is formed on the portions of the first base semiconductor layer except for the portions of the first base semiconductor layer having the emitter region and the emitter insulating layers (For Example: See Figure 3a);

f) an emitter electrode (39) formed on the emitter region (For Example: See Figure 3c); and

g) base electrodes (29) formed on the second base semiconductor layers at both sides of the emitter electrode (For Example: See Figure 3b).

In regards to claim 21, Ryum fails to disclose the following:

a) a base ohmic layers formed on the second base layers.

However, Arai discloses the use of a base ohmic layer (15) on base layer (14B) (For Example: See Figure 1). It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the semiconductor of Ryum to include the use of a base ohmic layer on base layer as disclosed in Arai because it aids in reducing base resistance (For Example: See Paragraph 90).

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Additionally, since Ryum and Arai are both from the same field of endeavor, the purpose disclosed by Arai would have been recognized in the pertinent art of Ryum.

b) first and second insulating layer patterns formed between the first and second isolation regions, respectively, and the first base semiconductor layer and first and second silicon layer patterns formed between the first and second insulating layer patterns, respectively, and the first base semiconductor layer.

However, Emons et al. ("Emons") discloses the use of first and second insulating layer patterns (9) formed between the first and second isolation regions (8), respectively, and the first base semiconductor layer and first and second silicon layer patterns (4) formed between the first and second insulating layer patterns, respectively, and the first base semiconductor layer (For Example: See Figure 7). It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the semiconductor of Ryum to include the use of first and second insulating layer patterns formed between the first and second isolation regions, respectively, and the first base semiconductor layer and first and second silicon layer patterns formed between the first and second insulating layer patterns, respectively, and the first base semiconductor layer as disclosed in Emons because it aids in providing a fast transistor (For Example: See Column 1 Lines 65-67).

Additionally, since Ryum and Emons are both from the same field of endeavor, the purpose disclosed by Emons would have been recognized in the pertinent art of Ryum.

In regards to claim 22, Ryum fails to disclose the following:

a) the second base semiconductor layer patterns are formed of an epitaxial growing layer.

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Finally, the following limitation makes it a product by process claim: a) "second base semiconductor layers are formed of an epitaxial growing layer." The MPEP § 2113, states, "Even though product -by[-] process claims are limited by and defined by the process, determination of patentability is based upon the product itself. The patentability of a product does not depend on its method of production. If the product in product-by-process claim is the same as or obvious from a product of the prior art, the claim is unpatentable even though the prior product is made by a different process." *In re Thorpe*, 227 USPQ 964, 966 (Fed. Cir. 1985)(citations omitted).

A "*product by process*" claim is directed to the product per se, no matter how actually made, *In re Hirao and Sato et al.*, 190 USPQ 15 at 17 (CCPA 1976) (footnote 3). See also *In re Brown and Saffer*, 173 USPQ 685 (CCPA 1972); *In re Luck and Gainer*, 177 USPQ 523 (CCPA 1973); *In re Fessmann*, 180 USPQ 324 (CCPA 1974); and *In re Marosi et al.*, 218 USPQ 289 (CAFC 1983) final product per se which must be determined in a "*product by, all of*" claim, and not the patentability of the process, and that an old or obvious product, whether claimed in "*product by process*" claims or not. Note that Applicant has the burden of proof in such cases, as the above caselaw makes clear.

In regards to claim 23, Ryum discloses the following:

a) the first conductivity type is p type and the second conductivity type is n-type (For Example: See Figure 3).

In regards to claim 26, Ryum fails to disclose the following:

a) a base ohmic layers are formed of metal silicide.

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However, Arai discloses the use of a base ohmic layer (15) made of metal silicide (For Example: See Paragraph 80). It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the semiconductor of Ryum to include the use of a base ohmic layer made of metal silicide as disclosed in Arai because it aids in reducing base resistance (For Example: See Paragraph 90).

Additionally, since Ryum and Arai are both from the same field of endeavor, the purpose disclosed by Arai would have been recognized in the pertinent art of Ryum.

In regards to claim 28, Ryum fails to disclose the following:

- a) insulating layers are formed of one of oxide layers and nitride layers.

However, Emons discloses the use of one of oxide and nitride layers (For Example: See Column 4 Lines 7 and 8). It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the semiconductor of Ryum to include the use of oxide and nitride layers as disclosed in Emons because it aids in providing a fast transistor (For Example: See Column 1 Lines 65-67).

Additionally, since Ryum and Emons are both from the same field of endeavor, the purpose disclosed by Emons would have been recognized in the pertinent art of Ryum.

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5. Claims 24 and 25 are rejected under 35 U.S.C. 103(a) as obvious over Ryum et al. (U.S. Publication No. 2002/0058388) in view of Arai (U.S. Publication No. 2004/023526), Emons et al. (U.S. Patent No. 6,100,152) and Kameyama (U.S. Patent No. 5,183,768).

In regards to claim 24, Ryum fails to disclose the following:

a) first selectively ion implanted collector (SIC) regions of the second conductivity type, which are formed at portions near the surface of the collector region and adjacent to the isolation regions.

However, Kameyama et al. ("Kameyama") discloses the use of a SIC region of a second conductivity type (120A) which are formed at portions near the surface of the collector region (104) and adjacent to the isolation regions (106) (For Example: See Figure 4d). It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the semiconductor of Ryum to include the use of a SIC region as disclosed in Kameyama because it aids in improving the speed of the transistor (For Example: See Column 1 Lines 32-37).

Additionally, since Ryum and Kameyama are both from the same field of endeavor, the purpose disclosed by Kameyama would have been recognized in the pertinent art of Ryum.

In regards to claim 25, Ryum fails to disclose the following:

a) a second SIC region of the second conductivity type, which is formed in a portion of the collector region under the emitter region.

However, Kameyama discloses the use of a second SIC region (120B) of a second conductivity type formed in a portion of the collector region under the emitter region (140A) (For Example: See Figure 4d). It would have been obvious to one having

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ordinary skill in the art at the time the invention was made to modify the semiconductor of Ryum to include the use of a SIC region as disclosed in Kameyama because it aids in improving the speed of the transistor (For Example: See Column 1 Lines 32-37).

Additionally, since Ryum and Kameyama are both from the same field of endeavor, the purpose disclosed by Kameyama would have been recognized in the pertinent art of Ryum.

6. Claim 27 is rejected under 35 U.S.C. 103(a) as obvious over Ryum et al. (U.S. Publication No. 2002/0058388) in view of Arai (U.S. Publication No. 2004/023526), Emons et al. (U.S. Patent No. 6,100,152) and Josquin (U.S. Patent No. 5,023,192).

In regards to claim 27, Ryum fails to disclose the following:

a) the base ohmic layers are formed of one of titanium silicide and cobalt silicide.

However, Josquin et al. ("Josquin") discloses the use of base ohmic layers formed of one of titanium silicide and cobalt silicide (For Example: See Column 7 Lines 52-54). It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the semiconductor of Ryum to include the use of titanium silicide and cobalt silicide as disclosed in Josquin because it aids in improving ohmic contact (For Example: See Column 7 Lines 52-54).

Additionally, since Ryum and Josquin are both from the same field of endeavor, the purpose disclosed by Josquin would have been recognized in the pertinent art of Ryum.

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7. Claim 28 is rejected under 35 U.S.C. 103(a) as obvious over Ryum et al. (U.S. Publication No. 2002/0058388) in view of Arai (U.S. Publication No. 2004/023526), Emons et al. (U.S. Patent No. 6,100,152) and Ryum et al. (U.S. Patent No. 5,798,277).

In regards to claim 28, Ryum fails to disclose the following:

a) insulating layers are formed of one of oxide layers and nitride layers.

However, Ryum discloses the use of oxide and nitride layers (For Example: See Column 6 Lines 16-20). It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the semiconductor of Ryum to include the use of oxide and nitride layers as disclosed in Ryum because it aids in enhancing the reliability of the device (For Example: See Column 6 Lines 16-20).

Additionally, since Ryum and Ryum are both from the same field of endeavor, the purpose disclosed by Ryum would have been recognized in the pertinent art of Ryum.

Conclusion

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Monica Lewis whose telephone number is 571-272-1838. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Zandra Smith can be reached on 571-272-2429. The fax phone number for

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the organization where this application or proceeding is assigned is 571-273-8300 for regular and after final communications.

ML

November 21, 2006

A handwritten signature in black ink, consisting of stylized cursive letters, likely 'Ull', followed by a long horizontal stroke extending to the right.